كلية الهندسة بشبين الكوم
Faculty of Engineering

توصيف المقررات

برنامج

الهندسة الكهربية والحاسبات

Electrical and Computer Engineering
Program specification

I. Basic information:

1- Program name	**Electrical and Computer Engineering**
2- Program type	**Single**
3- Adoption Date	**8/9/2006**
4- Study system	**Credit Hours System**

II. Specialized Information:

1- PROGRAM MISSION

The electrical and Computer engineering program contributes by its turn to the academic mission sought by the Faculty of Engineering. The program looks eagerly to prepare high quality graduates, who enjoy excellent background that combines deep knowledge and basic and professional skills in the field of electrical and computer engineering.

2- Academic Objectives

Electrical engineering discipline concerns with generation, transmission, distribution, utilization, and control of electric energy. It is well recognized that the interconnected electrical networks are considered as the largest and most complex man-made systems. Proper planning, design, implementation, operation and control of these large-scale electrical power systems require continuous search for advanced engineering knowledge, techniques and high technological skills. With a proper design of software and necessary hardware interface, computers and other digital systems can contribute largely in the generation, transmission and utilization of electric power. The objective of the Electrical and Computer Engineering Program (ECEP) is to provide students with adequate knowledge and skills required to operate and manage electrical power systems using computers, including building the necessary hardware and software program. The techniques and methodology which the student will gain in this program can be extended to operate and manage other engineering systems.

3-COMMUNITY NEEDS

Electrical energy is the most essential ingredient of all phases in modern societies. One measure of the nation's development is the yearly electrical energy consumption per capita. This renders the continuous increase and upgrades of the interconnections, which make the operation and control of electric systems, need the introduction of highly technical methods and solutions. The Ministry of Electricity Program involves continuous expansion of the transmission networks and building new power substations. This, however, requires that the hardware and software of the existing system to

be upgraded before a new substation is being commissioned. The lack of such upgrades affects to a large extent the operation and performance of electrical systems. Therefore, the objective of the Electrical and Computer Engineering Program (ECEP) is to graduate students which are able to operate and manage electrical power systems using computers. The skills and techniques in the Electrical and Computer Engineering Program (ECEP) are planned to graduate creative engineers who are able to upgrade engineering systems and developing the technology rather than importing it.

4-JOB OPPORTUNITIES FOR GRADUATES

Typical job opportunities for Electrical and Computer Engineering Program (ECEP) may be as follows:

- Electrical distribution companies
- Electrical power stations
- Electrical transmission companies and energy control centers
- Ministry of Electricity and Energy and associated organizations
- New and Renewable Energy Authority
- Electrical equipment and component manufacturers
- Electronics industries
- Communications companies and establishments
- Software Engineering
- Upgrading Engineering systems in both software and hardware
- Control Engineering and PLC Programming
- A wide range of industries that require computer interface and software building
- Underground and other transportation organizations

5-PROGRAM CHARACTERISTICS

The Electrical and Computer Engineering Program (ECEP) should be characterized by the following properties:

- To provide students with a wide introduction to basic sciences and mathematics with a thorough understanding of the fundamental knowledge necessary for engineering studies.
- To prepare students for engineering analysis and problem solving using appropriate mathematical and computational methodologies along with experimental and data analysis techniques.
- To provide students with the required depth in electrical and computer engineering subjects necessary for performing engineering jobs.
- To provide students with a good knowledge to design and implement computer hardware, digital circuits , microprocessor-based subsystems, and software engineering
- To provide students with elements of social sciences and humanities studies so that they understand the necessities for professionalism, ethical responsibilities and the needs to function in multidisciplinary teams.
- To prepare students to express themselves effectively in both oral and written communication.
- To prepare students for engineering analyses and problem solving using appropriate mathematical and computational methodologies.
- To teach students how to use experimental and data analysis techniques for electrical power and machines engineering applications.
- To provide students with awareness of tools and skills necessary for participating effectively in building a strong national economy and to meet current and future modern industry challenges.
- To provide students with principles of engineering design skills including creative ideas, project innovation, practical synthesis and management.

- To provide students with a necessary environment to working both individually and within groups, thus developing their communication skills.
- To provide students with essential knowledge of high interest for future postgraduate studies and research in the field of electrical and computer engineering.

6-PROGRAM OBJECTIVES

The graduates of the electrical and computer engineering programs should be able to:

O1)Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
O2) Design a system; component and process to meet the required needs within realistic constraints.
O3) Design and conduct experiments as well as analyze and interpret data.
O4) Identify, formulate and solve fundamental engineering problems.
O5) Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.
O6) Work effectively within multi-disciplinary teams.
O7) Communicate effectively.
O8) Consider the impacts of engineering solutions on society & environment.
O9) Demonstrate knowledge of contemporary engineering issues.
O10) Display professional and ethical responsibilities; and contextual understanding
O11) Engage in self- and life- long learning.
O12) Design and supervise the construction of systems to generate, transmit, control and use electrical energy.
O13) Design and develop heavy equipment, such as generators, motors, transmission lines and distributing systems.
O14) Plan and manage engineering activity during the diverse phases of electric power generation, transmission and control
O15) Prepare and reviews simple sketches, specifications and data sheets for electric power generation, control and distribution systems
O16) Perform design reviews and checks for electric power generation and distribution systems
O17) Perform review of supplier documentation for compliance with specifications
O18) Develops load lists
O19) Develops low voltage power systems.
O20) Demonstrate inductive reasoning abilities, figuring general rules and conclusions about seemingly unrelated events
O21) Use current advanced techniques, skills, and tools necessary for computing practices to specify, design, and implement computer-based systems.
O22) Recognize the information requirements of various business activities on both operational and decision making levels.
O23) Tackling business problems using system analysis tools and techniques.
O24) Managing projects related to computer systems in diverse fields of applications.
O25) Implementing phases of the computer system development life cycle, procurement and installation of hardware, software design, data manipulation and system operations.

7- PROGRAM ACADEMIC REFERENCE STANDARDS

The program adopts the National Academic Reference Standards (NARS) for Engineering, NARS for Characterization of Electrical Power Engineering, and NARS for Characterization of Computer Engineering which are:

Knowledge and Understanding	**Engineering**	A1) Concepts and theories of mathematics and sciences, appropriate to the discipline. A2) Basics of information and communication technology (ICT) A3) Characteristics of engineering materials related to the discipline. A4) Principles of design including elements design, process and/or a system related to specific disciplines. A5) Methodologies of solving engineering problems, data collection and interpretation A6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues. A7) Business and management principles relevant to engineering. A8) Current engineering technologies as related to disciplines. A9) Topics related to humanitarian interests and moral issues. A10) Technical language and report writing A11) Professional ethics and impacts of engineering solutions on society and environment A12) Contemporary engineering topics.
	Electrical Power Engineering	A13)Analytical and computer methods appropriate for electrical power and machines engineering. A14)Design methods and tools for electrical power and machines equipment and systems. A15)Principles of operation and performance specifications of electrical and electromechanical engineering systems. A16)Fundamentals of engineering management A17)Basic electrical power system theory A18)Theories and techniques for calculating short circuit, motor starting, and voltage drop A19)Diverse applications of electrical equipment A20)Logic circuits A21)Basic power system design concepts for underground, cable tray, grounding, and lighting systems A22)Basics of low voltage power systems A23)Principles of performing electrical system calculations, including load flow, earthling and equipment sizing
	COMPUTER ENGINEERING	A24) Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis. A25)Quality assessment of computer systems; A26)Related research and current advances in the field of computer software and hardware A27)Technologies of data, image and graphics representation and organization on computer storage media A28)Modern trends in information technology and its fundamental role in business enterprises

Intellectual Skills	**Engineering**	B1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems. B2) Select appropriate solutions for engineering problems based on analytical thinking. B3) Think in a creative and innovative way in problem solving and design. B4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources. B5) Assess and evaluate the characteristics and performance of components, systems and processes. B6) Investigate the failure of components, systems, and processes. B7) Solve engineering problems, often on the basis of limited and possibly contradicting information. B8) Select and appraise appropriate ICT tools to a variety of engineering problems. B9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact. B10) Incorporate economic, societal, environmental dimensions and risk management in design. B11) Analyze results of numerical models and assess their limitations. B12) Create systematic and methodic approaches when dealing with new and advancing technology.
	Electrical Power Engineering	B13)Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering. B14)Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines. B15)Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems. B16)Analyze the performance of electric power generation, control and distribution systems
	COMPUTER ENGINEERING	B17)Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems; B18)Select, synthesize, and apply suitable IT tools to computer engineering problems. B19)Proposing various computer-based solutions to business system problems. Cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved. B20)Identifying symptoms in problematic situations. B21)Innovating solutions based on non-traditional thinking and the use of latest technologies B22)Capability of integrating computer objects running on different system configurations.

Practical and Professional Skills	**Engineering**	C1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems. C2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs. C4) Practice the neatness and aesthetics in design and approach. C5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results. C6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs. C7) Apply numerical modeling methods to engineering problems. C8) Apply safe systems at work and observe the appropriate steps to manage risks. C9) Demonstrate basic organizational and project management skills. C10) Apply quality assurance procedures and follow codes and standards. C11) Exchange knowledge and skills with engineering community and industry. C12) Prepare and present technical reports.
	Electrical Power Engineering	C13)Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems. C14)Test and examine components, equipment and systems of electrical power and machines. C15)Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems. C16)Specify and evaluate manufacturing of components and equipment related to electrical power and machines. C17)Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.
	COMPUTER ENGINEERING	C18) Design and operate computer-based systems specifically designed for business applications. C19)Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development; C20)Write computer programs on professional levels achieving acceptable quality measures in software development. C21)Conducting user support activities competently.

General and Transferable Skills	**Engineering**	D1) Collaborate effectively within multidisciplinary team. D2) Work in stressful environment and within constraints. D3) Communicate effectively. D4) Demonstrate efficient IT capabilities. D5) Lead and motivate individuals. D6) Effectively manage tasks, time, and resources. D7) Search for information and engage in life-long self learning discipline. D8) Acquire entrepreneurial skills. D9) Refer to relevant literatures.

8-RELATIONSHIP BETWEEN ACADEMIC STANDARDS AND OBJECTIVES

Academic Standards		Program Objective																									
		O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13	O14	O15	O16	O17	O18	O19	O20	O21	O22	O23	O24	O25
Knowledge and Understanding	A1) Concepts and theories of mathematics and sciences, appropriate to the discipline.	*		*	*																					
	A2) Basics of information and communication technology (ICT)					*		*																		
	A3) Characteristics of engineering materials related to the discipline.		*	*																						
	A4) Principles of design including elements design, process and/or a system related to specific disciplines.		*		*				*																	
	A5) Methodologies of solving engineering problems, data collection and interpretation		*		*											*										
	A6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.		*	*	*	*			*																	
	A7) Business and management principles relevant to engineering.					*									*											
	A8) Current engineering technologies as related to disciplines.		*			*				*			*	*					*	*						
	A9) Topics related to humanitarian interests and moral issues.							*			*															
	A10) Technical language and report writing					*		*				*				*										
	A11) Professional ethics and impacts of engineering solutions on society and environment								*		*															
	A12) Contemporary engineering topics.									*																
	A13) Analytical and computer methods appropriate for electrical power and machines engineering.	*														*		*								
	A14) Design methods and tools for electrical power and machines equipment and systems.												*	*			*									
	A15) Principles of operation and performance specifications of electrical and electromechanical engineering systems.														*	*	*									
	A16) Fundamentals of engineering management					*									*											
	A17) Basic electrical power system theory												*	*												
	A18) Theories and techniques for calculating short circuit, motor starting, and voltage drop													*			*	*								
	A19) Diverse applications of electrical equipment												*						*	*						
	A20) Logic circuits					*									*	*										

	A21) Basic power system design concepts for underground, cable tray, grounding, and lighting systems											*													
	A22) Basics of low voltage power systems																		*						
	A23) Principles of performing electrical system calculations, including load flow, earthling and equipment sizing																*	*							
	A24) Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.																				*				*
	A25)Quality assessment of computer systems;																			*					*
	A26)Related research and current advances in the field of computer software and hardware																				*			*	*
	A27)Technologies of data, image and graphics representation and organization on computer storage media																			*	*				
	A28)Modern trends in information technology and its fundamental role in business enterprises																					*	*		

Academic Standards		Program Objective																									
		O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13	O14	O15	O16	O17	O18	O19	O20	O21	O22	O23	O24	O25
Intellectual Skills	B1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	*	*		*												*									
	B2) Select appropriate solutions for engineering problems based on analytical thinking.	*	*		*											*		*								
	B3) Think in a creative and innovative way in problem solving and design.	*	*		*								*	*			*									
	B4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.	*		*	*				*	*		*														
	B5) Assess and evaluate the characteristics and performance of components, systems and processes.		*	*	*											*	*									
	B6) Investigate the failure of components, systems, and processes.	*	*	*											*											
	B7) Solve engineering problems, often on the basis of limited and possibly contradicting information.		*		*				*																	
	B8) Select and appraise appropriate ICT tools to a variety of engineering problems.		*		*	*							*		*											
	B9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.		*		*	*			*									*								
	B10) Incorporate economic, societal, environmental dimensions and risk management in design.		*		*				*						*		*									
	B11) Analyze results of numerical models and assess their limitations.	*	*			*											*									
	B12) Create systematic and methodic approaches when dealing with new and advancing technology.		*			*							*						*	*						
	B13)Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.														*		*	*								
	B14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines.			*												*	*									
	B15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.												*		*											
	B16) Analyze the performance of electric power generation, control and distribution systems												*	*			*	*								

	B17)Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems;																			*					
	B18)Select, synthesize, and apply suitable IT tools to computer engineering problems.																			*					
	B19)Proposing various computer-based solutions to business system problems. Cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved.																					*			
	B20)Identifying symptoms in problematic situations.																		*						
	B21)Innovating solutions based on non-traditional thinking and the use of latest technologies																			*					
	B22)Capability of integrating computer objects running on different system configurations.																							*	

Academic Standards		Program Objective																									
		O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13	O14	O15	O16	O17	O18	O19	O20	O21	O22	O23	O24	O25
Practical and Professional Skills	C1) Apply knowledge of mathematics, science, information technology, design, business content and engineering practice integrally to solve engineering problems.	*	*	*	*	*																				
	C2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.	*	*		*				*					*			*									
	C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.		*		*				*					*			*									
	C4) Practice the neatness and aesthetics in design and approach.		*			*			*		*		*													
	C5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.			*		*												*								
	C6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.	*	*	*		*																				
	C7) Apply numerical modeling methods to engineering problems.	*															*	*								
	C8) Apply safe systems at work and observe the appropriate steps to manage risks.			*		*					*				*											
	C9) Demonstrate basic organizational and project management skills.					*									*											
	C10) Apply quality assurance procedures and follow codes and standards.		*			*												*								
	C11) Exchange knowledge and skills with engineering community and industry.						*	*		*		*														
	C12) Prepare and present technical reports.							*				*				*		*								
	C13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.												*	*			*	*								
	C14) Test and examine components, equipment and systems of electrical power and machines.																*	*								
	C15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.												*		*											

	C16) Specify and evaluate manufacturing of components and equipment related to electrical power and machines.															*	*								
	C17) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.											*	*			*									
	C18) Design and operate computer-based systems specifically designed for business applications.																						*		
	C19)Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development;																				*				
	C20)Write computer programs on professional levels achieving acceptable quality measures in software development.																				*				
	C21)Conducting user support activities competently.																			*					

Academic Standards		Program Objective																									
		O1	O2	O3	O4	O5	O6	O7	O8	O9	O10	O11	O12	O13	O14	O15	O16	O17	O18	O19	O20	O21	O22	O23	O24	O25
General and Transferable Skills	D1) Collaborate effectively within multidisciplinary team.						*	*																		
	D2) Work in stressful environment and within constraints.								*		*															
	D3) Communicate effectively.						*	*																		
	D4) Demonstrate efficient IT capabilities.					*																*				
	D5) Lead and motivate individuals.						*	*																		
	D6) Effectively manage tasks, time, and resources.					*	*				*															
	D7) Search for information and engage in life-long self learning discipline.		*		*					*		*														
	D8) Acquire entrepreneurial skills.					*	*				*															
	D9) Refer to relevant literatures.							*	*		*	*														

9-INTENDED LEARNING OUTCOMES (ILOS) OF THE PROGRAM

The program extracts its Intended Learning Outcomes (ILOs) from the National Academic Reference Standards (NARS) for Engineering, NARS Characterization of Electrical Power Engineering and Computer Engineering as follows:

Academic Standards of the program		Intended Learning Outcomes (ILOs) of the program
Knowledge and Understanding	A1) Concepts and theories of mathematics and sciences, appropriate to the discipline.	**A1)Demonstrate** understanding of Concepts and theories of mathematics and sciences, appropriate to electrical engineering.
	A2) Basics of information and communication technology (ICT)	**A2) Demonstrate** understanding of Basics of information and communication technology (ICT)
	A3) Characteristics of engineering materials related to the discipline.	**A3) Demonstrate** Characteristics of engineering materials related to electrical engineering.
	A4) Principles of design including elements design, process and/or a system related to specific disciplines.	**A4)Demonstrate** Principles of design including elements design, process and/or a system related to electrical power engineering.
	A5) Methodologies of solving engineering problems, data collection and interpretation	**A5) Illustrate** Methodologies of solving engineering problems, data collection and interpretation
	A6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	**A6) Explain** Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.
	A7) Business and management principles relevant to engineering.	**A7) Remember** Business and management principles relevant to engineering.
	A8) Current engineering technologies as related to disciplines.	**A8) Explain** Current engineering technologies as related to electrical engineering.
	A9) Topics related to humanitarian interests and moral issues.	**A9) Discuss** Topics related to humanitarian interests and moral issues.
	A10) Technical language and report writing	**A10) Write** report with technical language
	A11) Professional ethics and impacts of engineering solutions on society and environment	**A11) Recognise** Professional ethics and impacts of engineering solutions on society and environment
	A12) Contemporary engineering topics.	**A12) Recognise** Contemporary engineering topics.
	A13) Analytical and computer methods appropriate for electrical power and machines engineering.	**A13) Choose** analytical and computer methods appropriate for electrical power and machines engineering.
	A14) Design methods and tools for electrical power and machines equipment and systems.	**A14) Distinguish** design methods and tools for electrical power and machines equipment and systems.
	A15) Principles of operation and performance specifications of electrical and electromechanical engineering systems.	**A15) Explain** principles of operation and performance specifications of electrical and electromechanical engineering systems.
	A16) Fundamentals of engineering management	**A16) Apply** fundamentals of engineering management.
	A17) Basic electrical power system theory	**A17) Explain** basic electrical power system theory.
	A18) Theories and techniques for calculating short circuit, motor starting, and voltage drop	**A18) Apply** theories and techniques for calculating short circuit, motor starting, and voltage drop.
	A19) Diverse applications of electrical equipment	**A19) Define** diverse applications of electrical equipment.
	A20) Logic circuits	**A20) Classify** logic circuits.
	A21) Basic power system design concepts for underground, cable tray, grounding, and lighting systems	**A21) Distinguish** basic power system design concepts for underground, cable tray, grounding, and lighting systems.
	A22) Basics of low voltage power systems	**A22) Explain** basics of low voltage power systems.
	A23) Principles of performing electrical system calculations, including load flow, earthling and equipment sizing	**A23) Generalize** principles of performing electrical system calculations, including load flow, earthing and equipment sizing.
	A24) Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.	**A24) Demonstrate** Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.
	A25)Quality assessment of computer systems;	**A25)Explain** Quality assessment of computer systems;
	A26)Related research and current advances in the field of computer software and hardware	**A26)Discuss** Related research and current advances in the field of computer software and hardware.
	A27)Technologies of data, image and graphics representation and organization on computer storage media	**A27) Recognise** Technologies of data, image and graphics representation and organization on computer storage media.
	A28)Modern trends in information technology and its fundamental role in business enterprises	**A28)Demonstrate** Modern trends in information technology and its fundamental role in business enterprises.

Academic Standards of the program		Intended Learning Outcomes (ILOs) of the program
Intellectual Skills	B1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	B1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.
	B2) Select appropriate solutions for engineering problems based on analytical thinking.	B2) Select appropriate solutions for engineering problems based on analytical thinking.
	B3) Think in a creative and innovative way in problem solving and design.	B3) Think in a creative and innovative way in problem solving and design.
	B4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.	B4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
	B5) Assess and evaluate the characteristics and performance of components, systems and processes.	B5) Assess and evaluate the characteristics and performance of components, systems and processes.
	B6) Investigate the failure of components, systems, and processes.	B6) Investigate the failure of components, systems, and processes.
	B7) Solve engineering problems, often on the basis of limited and possibly contradicting information.	B7) Solve engineering problems, often on the basis of limited and possibly contradicting information.
	B8) Select and appraise appropriate ICT tools to a variety of engineering problems.	B8) Select and appraise appropriate ICT tools to a variety of engineering problems.
	B9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	B9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
	B10) Incorporate economic, societal, environmental dimensions and risk management in design.	B10) Incorporate economic, societal, environmental dimensions and risk management in design.
	B11) Analyze results of numerical models and assess their limitations.	B11) Analyze results of numerical models and assess their limitations.
	B12) Create systematic and methodic approaches when dealing with new and advancing technology.	B12) Create systematic and methodic approaches when dealing with new and advancing technology.
	B13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.	B13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.
	B14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines.	B14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines.
	B15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	B15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.
	B16) Analyze the performance of electric power generation, control and distribution systems	B16) Analyze the performance of electric power generation, control and distribution systems
	B17)Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems;	B17)Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems;
	B18)Select, synthesize, and apply suitable IT tools to computer engineering problems.	B18)Select, synthesize, and apply suitable IT tools to computer engineering problems.
	B19)Proposing various computer-based solutions to business system problems. Cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved.	B19)Proposing various computer-based solutions to business system problems. Cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved.
	B20)Identifying symptoms in problematic situations.	B20)Identifying symptoms in problematic situations.
	B21)Innovating solutions based on non-traditional thinking and the use of latest technologies	B21)Innovating solutions based on non-traditional thinking and the use of latest technologies
	B22)Capability of integrating computer objects running on different system configurations.	B22)Capability of integrating computer objects running on different system configurations.

Academic Standards of the program		Intended Learning Outcomes (ILOs) of the program
Practical and Professional Skills	C1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	C1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
	C2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.	C2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.
	C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.	C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.
	C4) Practice the neatness and aesthetics in design and approach.	C4) Practice the neatness and aesthetics in design and approach.
	C5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	C5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.
	C6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.	C6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.
	C7) Apply numerical modeling methods to engineering problems.	C7) Apply numerical modeling methods to engineering problems.
	C8) Apply safe systems at work and observe the appropriate steps to manage risks.	C8) Apply safe systems at work and observe the appropriate steps to manage risks.
	C9) Demonstrate basic organizational and project management skills.	C9) Demonstrate basic organizational and project management skills.
	C10) Apply quality assurance procedures and follow codes and standards.	C10) Apply quality assurance procedures and follow codes and standards.
	C11) Exchange knowledge and skills with engineering community and industry.	C11) Exchange knowledge and skills with engineering community and industry.
	C12) Prepare and present technical reports.	C12) Prepare and present technical reports.
	C13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.	C13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.
	C14) Test and examine components, equipment and systems of electrical power and machines.	C14) Test and examine components, equipment and systems of electrical power and machines.
	C15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	C15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.
	C16) Specify and evaluate manufacturing of components and equipment related to electrical power and machines.	C16) Specify and evaluate manufacturing of components and equipment related to electrical power and machines.
	C17) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.	C17) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.
	C18) Design and operate computer-based systems specifically designed for business applications.	C18) Design and operate computer-based systems specifically designed for business applications.
	C19)Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development;	C19)Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development;
	C20)Write computer programs on professional levels achieving acceptable quality measures in software development.	C20)Write computer programs on professional levels achieving acceptable quality measures in software development.
	C21)Conducting user support activities competently.	C21)Conducting user support activities competently.

Academic Standards of the program		Intended Learning Outcomes (ILOs) of the program
General Skills	D1) Collaborate effectively within multidisciplinary team.	D1) Collaborate effectively within multidisciplinary team.
	D2) Work in stressful environment and within constraints.	D2) Work in stressful environment and within constraints.
	D3) Communicate effectively.	D3) Communicate effectively.
	D4) Demonstrate efficient IT capabilities.	D4) Demonstrate efficient IT capabilities.
	D5) Lead and motivate individuals.	D5) Lead and motivate individuals.
	D6) Effectively manage tasks, time, and resources.	D6) Effectively manage tasks, time, and resources.
	D7) Search for information and engage in life-long self learning discipline.	D7) Search for information and engage in life-long self learning discipline.
	D8) Acquire entrepreneurial skills.	D8) Acquire entrepreneurial skills.
	D9) Refer to relevant literatures.	D9) Refer to relevant literatures.

10-Relation between ILOS and Courses

Intended Learning Outcomes (ILOs) of the program		Courses that asses in realizing ILOS
	By the end of the program, student should be able to:	
Knowledge and Understanding	**A1)Demonstrate** understanding of Concepts and theories of mathematics and sciences, appropriate to electrical engineering.	BES001, BES002, BES003, BES004, BES005, BES101, BES102, BES103, BES104, ECE003, ECE101, ECE201, ECE214, ECE301, ECE415, PRE001
	A2) Demonstrate understanding of Basics of information and communication technology (ICT)	ECE102, ECE108, ECE213, ECE304, GEN002
	A3) Demonstrate Characteristics of engineering materials related to electrical engineering.	BES002, ECE003, ECE101, ECE106, ECE202, PRE002
	A4)Demonstrate Principles of design including elements design, process and/or a system related to electrical power engineering.	ECE203, ECE209, ECE303, ECE307, ECE407, ECE410, ECE411, ECE416
	A5) Illustrate Methodologies of solving engineering problems, data collection and interpretation	BES001, BES003, BES005, BES101, BES103, BES104, ECE107, ECE108, ECE109, ECE201, ECE213, ECE301, ECE302, ECE401, GEN302
	A6) Explain Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	ECE411, ECE412, ECE415, GEN102, GEN301, PRE002,
	A7) Remember Business and management principles relevant to engineering.	ECE109, ECE210, ECE310, GEN102, GEN203, GEN304, GEN204
	A8) Explain Current engineering technologies as related to electrical engineering.	ECE001, ECE003, ECE103, ECE303, ECE404, ECE406, ECE411, ECE415, PRE002
	A9) Discuss Topics related to humanitarian interests and moral issues.	ECE213, GEN101, GEN001, GEN003, GEN004, GEN201, GEN202
	A10) Write report with technical language	ECE401, ECE412, GEN001, GEN301
	A11) Recognise Professional ethics and impacts of engineering solutions on society and environment	ECE109, GEN103, GEN201
	A12) Recognise Contemporary engineering topics.	ECE311, ECE313, ECE407, ECE408, ECE409, ECE412, ECE413
	A13) Choose analytical and computer methods appropriate for electrical power and machines engineering.	ECE107, ECE104, ECE108, ECE213, ECE305, ECE403, ECE410, ECE416
	A14) Distinguish design methods and tools for electrical power and machines equipment and systems.	ECE002, ECE208, ECE302, ECE401, ECE403, ECE404, ECE410, ECE416
	A15) Explain principles of operation and performance specifications of electrical and electromechanical engineering systems.	ECE003,ECE101, ECE209, ECE211, ECE309, ECE313, ECE405, ECE414
	A16) Apply fundamentals of engineering management.	GEN102, GEN302, ECE401, ECE412
	A17) Explain basic electrical power system theory.	ECE101, ECE104, ECE211, ECE305, ECE405
	A18) Apply theories and techniques for calculating short circuit, motor starting, and voltage drop.	ECE209, ECE211, ECE307, ECE401, ECE405
	A19) Define diverse applications of electrical equipment.	ECE106, ECE209, ECE303, ECE309, ECE406, ECE410, ECE411, ECE416
	A20) Classify logic circuits.	ECE105, ECE208, ECE214, ECE302, ECE304, ECE409
	A21) Distinguish basic power system design concepts for underground, cable tray, grounding, and lighting systems.	ECE202, ECE411, ECE415
	A22) Explain basics of low voltage power systems.	ECE104, ECE211, ECE305
	A23) Generalize principles of performing electrical system calculations, including load flow, earthing and equipment sizing.	ECE411, ECE405, ECE412
	A24) Demonstrate Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.	ECE204, ECE208, ECE304, ECE311, ECE402, ECE404, ECE409, ECE413
	A25)Explain Quality assessment of computer systems;	ECE102, ECE208, ECE304, ECE412, GEN002
	A26)Discuss Related research and current advances in the field of computer software and hardware.	ECE212, ECE408, ECE409, ECE413
	A27) Recognise Technologies of data, image and graphics representation and organization on computer storage media.	ECE102, ECE107, ECE109, ECE210, ECE306, ECE308, ECE310, ECE312, ECE408, ECE309
	A28)Demonstrate Modern trends in information technology and its fundamental role in business enterprises.	ECE102, ECE109, ECE210, ECE306, GEN201

Intended Learning Outcomes (ILOs) of the program		Courses that asses in realizing ILOS
	By the end of the program, student should be able to:	
Intellectual Skills	B1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	BES001, BES003, BES101, BES102, BES103, BES104, ECE106, ECE107, ECE108, ECE210, ECE213, ECE301, ECE306, ECe401, ECE403, ECE404, GEN002, GEN203, GEN204
	B2) Select appropriate solutions for engineering problems based on analytical thinking.	BES002, BES005, ECE003, ECE107, ECE108, ECE213, ECE411, GEN103, PRE001
	B3) Think in a creative and innovative way in problem solving and design.	BES002, BES005, ECE002, ECE001, ECE302, GEN202, GEN302, PRE002
	B4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.	ECE101, GEN001, GEN003, GEN004
	B5) Assess and evaluate the characteristics and performance of components, systems and processes.	BES004, ECE202, ECE204, ECE209, ECE309, ECE414, ECE415
	B6) Investigate the failure of components, systems, and processes.	ECE106, ECE202, ECE412
	B7) Solve engineering problems, often on the basis of limited and possibly contradicting information.	BES102, ECE107, ECE108, ECE201, ECE213
	B8) Select and appraise appropriate ICT tools to a variety of engineering problems.	ECE107, ECE108, ECE109, ECE213, ECE301,GEN002
	B9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	ECE201, GEN102, GEN301, GEN302
	B10) Incorporate economic, societal, environmental dimensions and risk management in design.	GEN101, GEN102, GEN202, GEN204, GEN302
	B11) Analyze results of numerical models and assess their limitations.	BES102, BES103, GEN301
	B12) Create systematic and methodic approaches when dealing with new and advancing technology.	ECE001, ECE107, ECE306, ECE311
	B13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.	ECE003, ECE101, ECE103, ECE104, ECE209, ECE211, ECE301, ECE305, ECE309, ECE313, ECE405, ECE406, ECE407, ECE410, ECE415, ECE416, GEN301
	B14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines.	ECE203, ECE301, ECE313, ECE405, ECE407
	B15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	ECE103, ECE105, ECE214, ECE302, ECE414
	B16) Analyze the performance of electric power generation, control and distribution systems	ECE211, ECE301, ECE410, ECE416
	B17)Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems;	ECE107, ECE109, ECE210, ECE212, ECE306
	B18)Select, synthesize, and apply suitable IT tools to computer engineering problems.	ECE102, ECE109, ECE208, ECE210, ECE306, ECE304, ECE308, ECE312, ECE309, ECE310, ECE311, ECE402, ECE408, ECE409, ECE413
	B19)Proposing various computer-based solutions to business system problems. Cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved.	ECE107, ECE109, ECE210, ECE306
	B20)Identifying symptoms in problematic situations.	ECE109, ECE402, ECE412
	B21)Innovating solutions based on non-traditional thinking and the use of latest technologies	ECE109, ECE210, ECE212, ECE306, ECE309, ECE409, ECE413, GEN201
	B22)Capability of integrating computer objects running on different system configurations.	ECE102, ECE408, ECE409, ECE412

Intended Learning Outcomes (ILOs) of the program		Courses that asses in realizing ILOS
Practical and Professional Skills	By the end of the program, student should be able to:	
	C1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	BES001, BES002, BES003, BES004, BES005, BES101, BES102, BES103, BES104, ECE003, ECE106, ECE108, ECE201, ECE213, ECE401, ECE405, ECE414, ECE415, GEN002, GEN202, GEN203, GEN302, PRE001, PRE002
	C2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.	ECE001, ECE107, ECE109, ECE210, ECE306, ECE313, ECE412
	C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.	ECE106, ECE109, ECE212, ECE302, ECE312, ECE313
	C4) Practice the neatness and aesthetics in design and approach.	ECE106, GEN003, GEN001, GEN004, GEN103
	C5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	BES004, ECE106, ECE108, ECE203, ECE204, ECE213, ECE401, ECE412, ECE415
	C6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.	ECE107, ECE108, ECE213, ECE301,ECE302,GEN002
	C7) Apply numerical modeling methods to engineering problems.	BES001, BES003, BES103, BES101, BES102, BES104, ECE202, ECE305, ECE313, ECE401,GEN002
	C8) Apply safe systems at work and observe the appropriate steps to manage risks.	GEN101, GEN102, ECE212, PRE002
	C9) Demonstrate basic organizational and project management skills.	ECE109, ECE212, ECE401, GEN204
	C10) Apply quality assurance procedures and follow codes and standards.	ECE401, ECE412, GEN102, GEN302
	C11) Exchange knowledge and skills with engineering community and industry.	ECE401, ECE412, GEN201, GEN204, PRE002
	C12) Prepare and present technical reports.	ECE203, ECE401, ECE412, GEN001, GEN003, GEN004, GEN301
	C13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.	ECE002, ECE101, ECE103, ECE104, ECE105, ECE209, ECE214, ECE302, ECE401, ECE403, ECE404, ECE406, ECE411, ECE412
	C14) Test and examine components, equipment and systems of electrical power and machines.	ECE209, ECE309, ECE401, ECE412
	C15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	ECE208, ECE214, ECE311, ECE401, ECE409, ECE412, ECE414
	C16) Specify and evaluate manufacturing of components and equipment related to electrical power and machines.	ECE202, ECE211, ECE313, ECE401, ECE410, ECE412, ECE416, GEN301
	C17) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.	ECE301, ECE401, ECE405, ECE406, ECE407, ECE410, ECE412, ECE416
	C18) Design and operate computer-based systems specifically designed for business applications.	ECE102, ECE109, ECE214, ECE306, ECE401, ECE408, ECE413
	C19)Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development;	ECE102, ECE208, ECE210, ECE212, ECE302, ECE304, ECE308, ECE309, ECE306, ECE310, ECE311, ECE402, ECE408, ECE413,GEN201
	C20)Write computer programs on professional levels achieving acceptable quality measures in software development.	ECE107, ECE212, ECE311, ECE402, ECE403, ECE404, ECE409
	C21)Conducting user support activities competently.	ECE109, ECE210, ECE306

Intended Learning Outcomes (ILOS) of the program		Courses that asses in realizing ILOS
General Skills	By the end of the program, student should be able to:	
	D1) Collaborate effectively within multidisciplinary team.	BES101, ECE001, ECE002, ECE003, ECE103, ECE104, ECE105, ECE107, ECE109, ECE201, ECE203, ECE204, ECE209, ECE210, ECE214, ECE301, ECE302, ECE305, ECE306, ECE308, ECE309, ECE310, ECE311, ECE401, ECE403, ECE404, ECE407, ECE409, ECE410, ECE412, ECE413, ECE416, GEN101, GEN102, GEN103, GEN201, GEN202, GEN203, GEN204, GEN301
	D2) Work in stressful environment and within constraints.	BES004, ECE313, ECE401, ECE411, ECE415, GEN102, PRE002
	D3) Communicate effectively.	BES001, BES002, BES003, BES005, BES103, BES101, BES105, ECE001, ECE102, ECE109, ECE203, ECE210, ECE213, ECE301, ECE302, ECE311, ECE401, ECE407, ECE410, ECE412, ECE414, ECE416, GEN002, GEN001, GEN003, GEN004, GEN101, GEN103, GEN201, GEN302, PRE001
	D4) Demonstrate efficient IT capabilities.	ECE102, ECE103, ECE104, ECE105, ECE106, ECE107, ECE108, ECE109, ECE201, ECE203, ECE204, ECE208, ECE210, ECE212, ECE213, ECE214, ECE301, ECE302, ECE304, ECE305, ECE306, ECE308, ECE309, ECE310, ECE311, ECE401, ECE402, EECE403, ECE404, ECE407, ECE408, ECE409, ECE412, ECE413, GEN002, GEN201
	D5) Lead and motivate individuals.	BES004, ECE109, ECE401, ECE414, GEN102, GEN201
	D6) Effectively manage tasks, time, and resources.	ECE001,ECE202, ECE109, ECE406, ECE415, GEN201
	D7) Search for information and engage in life-long self learning discipline.	ECE101, ECE108, ECE302, ECE414, GEN201
	D8) Acquire entrepreneurial skills.	ECE210, ECE306, ECE401, ECE412, GEN102, GEN203, GEN204, GEN301
	D9) Refer to relevant literatures.	ECE106, ECE211, ECE405, ECE411, GEN001, GEN003, GEN004

11- Teaching and Learning Methods

Intended Learning Outcomes (ILOS) of the program	Teaching and Learning Methods												
	Lectures	Presentations and Movies	Discussions	Tutorials	Problem Solving	Brain storming	Projects	Site Visits	Research and Reporting	Group Working	Discovering	Simulation and Modelling	Lab. Experiments
By the end of the program, student should be able to:													
A1)Demonstrate understanding of Concepts and theories of mathematics and sciences, appropriate to electrical engineering.	*	*	*	*	*	*	*		*	*			*
A2) Demonstrate understanding of Basics of information and communication technology (ICT)	*		*	*	*	*			*	*			*
A3) Demonstrate Characteristics of engineering materials related to electrical engineering.	*		*	*	*				*	*		*	
A4)Demonstrate Principles of design including elements design, process and/or a system related to electrical power engineering.	*	*	*	*	*	*	*	*	*	*			
A5) Illustrate Methodologies of solving engineering problems, data collection and interpretation	*	*	*	*	*	*	*	*		*		*	*
A6) Explain Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	*	*	*	*	*	*		*	*	*			
A7) Remember Business and management principles relevant to engineering.	*		*						*	*			
A8) Explain Current engineering technologies as related to electrical engineering.	*	*	*	*	*	*	*	*	*	*		*	*
A9) Discuss Topics related to humanitarian interests and moral issues.	*		*			*	*			*			
A10) Write report with technical language	*	*	*	*		*	*	*	*	*			*
A11) Recognise Professional ethics and impacts of engineering solutions on society and environment	*		*			*	*		*	*			
A12) Recognise Contemporary engineering topics.	*	*	*	*	*				*	*			
A13) Choose analytical and computer methods appropriate for electrical power and machines engineering.	*	*	*	*			*		*	*		*	
A14) Distinguish design methods and tools for electrical power and machines equipment and systems.	*		*	*	*	*						*	
A15) Explain principles of operation and performance specifications of electrical and electromechanical engineering systems.	*	*	*	*	*		*	*					
A16) Apply fundamentals of engineering management.	*		*		*		*	*		*			
A17) Explain basic electrical power system theory.	*	*			*					*			
A18) Apply theories and techniques for calculating short circuit, motor starting, and voltage drop.	*		*	*	*					*		*	*
A19) Define diverse applications of electrical equipment.	*	*	*	*	*	*			*	*			
A20) Classify logic circuits.	*			*	*								*
A21) Distinguish basic power system design concepts for underground, cable tray, grounding, and lighting systems.	*		*	*	*	*		*					
A22) Explain basics of low voltage power systems.	*	*		*	*			*				*	
A23) Generalize principles of performing electrical system calculations, including load flow, earthing and equipment sizing.	*	*	*	*	*	*	*		*	*		*	
A24) Demonstrate Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.	*		*	*	*		*		*			*	*
A25)Explain Quality assessment of computer systems.-1	*												
A26)Discuss Related research and current advances in the field of computer software and hardware.	*	*	*	*	*		*		*				*
A27) Recognise Technologies of data, image and graphics representation and organization on computer storage media.	*	*	*	*	*		*		*				*
A28)Demonstrate Modern trends in information technology and its fundamental role in business enterprises.	*	*	*	*	*		*		*				*

Intended Learning Outcomes (ILOS) of the program	Teaching and Learning Methods												
	Lectures	Presentations and Movies	Discussions	Tutorials	Problem Solving	Brain storming	Projects	Site Visits	Research and Reporting	Group Working	Discovering	Simulation and Modelling	Lab. Experiments
By the end of the program, student should be able to:													
B1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	*	*	*	*	*	*	*		*	*		*	*
B2) Select appropriate solutions for engineering problems based on analytical thinking.	*	*	*	*	*	*	*		*	*	*	*	
B3) Think in a creative and innovative way in problem solving and design.	*	*	*	*	*	*	*		*	*	*	*	*
B4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.	*	*	*	*	*	*	*	*	*	*	*		
B5) Assess and evaluate the characteristics and performance of components, systems and processes.	*	*	*	*	*		*		*	*		*	*
B6) Investigate the failure of components, systems, and processes.	*	*	*	*	*		*	*	*	*		*	*
B7) Solve engineering problems, often on the basis of limited and possibly contradicting information.	*		*	*	*	*	*		*	*			
B8) Select and appraise appropriate ICT tools to a variety of engineering problems.	*	*	*	*	*	*	*	*	*	*			*
B9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	*	*		*	*	*	*	*	*	*			
B10) Incorporate economic, societal, environmental dimensions and risk management in design.	*		*	*			*	*		*			
B11) Analyze results of numerical models and assess their limitations.	*		*	*	*	*	*		*		*	*	
B12) Create systematic and methodic approaches when dealing with new and advancing technology.	*		*	*		*	*	*	*	*	*		
B13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.	*		*	*	*	*	*		*	*			
B14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines.	*		*	*	*	*				*			*
B15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	*	*		*	*		*	*	*	*	*	*	*
B16) Analyze the performance of electric power generation, control and distribution systems	*		*	*	*	*	*	*		*			
B17)Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems.	*	*		*	*		*					*	
B18)Select, synthesize, and apply suitable IT tools to computer engineering problems.	*	*		*	*								*
B19)Proposing various computer-based solutions to business system problems. Cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved.	*	*		*	*		*						*
B20)Identifying symptoms in problematic situations.	*		*		*	*			*			*	
B21)Innovating solutions based on non-traditional thinking and the use of latest technologies	*	*		*	*	*			*			*	
B22)Capability of integrating computer objects running on different system configurations.	*								*			*	*

Intended Learning Outcomes (ILOS) of the program	Teaching and Learning Methods												
	Lectures	Presentations and Movies	Discussions	Tutorials	Problem Solving	Brain storming	Projects	Site Visits	Research and Reporting	Group Working	Discovering	Simulation and Modelling	Lab. Experiments
By the end of the program, student should be able to:													
C1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	*	*	*	*	*	*	*	*	*	*		*	
C2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.	*	*	*	*	*	*	*	*	*	*		*	
C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.	*	*	*	*	*	*	*	*	*	*			
C4) Practice the neatness and aesthetics in design and approach.	*		*	*			*	*	*	*	*		
C5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	*		*	*	*	*	*	*	*	*		*	*
C6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.	*	*	*	*	*	*	*	*	*	*		*	*
C7) Apply numerical modeling methods to engineering problems.	*	*		*	*		*	*	*			*	*
C8) Apply safe systems at work and observe the appropriate steps to manage risks.	*	*	*				*	*	*	*	*		
C9) Demonstrate basic organizational and project management skills.			*				*	*		*			
C10) Apply quality assurance procedures and follow codes and standards.	*		*	*			*	*	*	*	*		
C11) Exchange knowledge and skills with engineering community and industry.	*	*	*	*	*		*	*	*	*	*		
C12) Prepare and present technical reports.	*	*	*	*	*	*	*	*	*	*			*
C13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.	*		*	*	*		*	*		*		*	*
C14) Test and examine components, equipment and systems of electrical power and machines.	*	*		*	*		*			*			*
C15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	*	*	*	*	*		*	*		*		*	*
C16) Specify and evaluate manufacturing of components and equipment related to electrical power and machines.	*		*				*	*	*	*			*
C17) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.	*	*	*	*	*		*		*	*	*	*	*
C18) Design and operate computer-based systems specifically designed for business applications.	*			*	*		*					*	
C19)Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development;	*			*	*		*					*	*
C20)Write computer programs on professional levels achieving acceptable quality measures in software development.	*			*	*		*					*	*
C21)Conducting user support activities competently.	*					*				*	*		

Intended Learning Outcomes (ILOS) of the program	Teaching and Learning Methods												
	Lectures	Presentations and Movies	Discussions	Tutorials	Problem Solving	Brain storming	Projects	Site Visits	Research and Reporting	Group Working	Discovering	Simulation and Modelling	Lab. Experiments
By the end of the program, student should be able to:													
D1) Collaborate effectively within multidisciplinary team.	*	*	*	*	*	*	*	*	*	*	*		*
D2) Work in stressful environment and within constraints.	*	*	*			*	*	*	*	*	*		
D3) Communicate effectively.	*	*	*	*	*	*	*	*	*	*	*		
D4) Demonstrate efficient IT capabilities.		*	*	*	*	*	*	*	*	*	*	*	*
D5) Lead and motivate individuals.		*	*	*	*	*	*	*	*	*	*	*	*
D6) Effectively manage tasks, time, and resources.	*		*				*	*	*	*			
D7) Search for information and engage in life-long self learning discipline.	*	*	*	*	*	*	*	*	*	*			
D8) Acquire entrepreneurial skills.							*	*	*	*			
D9) Refer to relevant literatures.	*		*	*	*	*	*	*	*	*	*		

12-Assessment Methods

Intended Learning Outcomes (ILOS) of the program	Assessment Methods											
	Written Examine	Oral Examine	Tutorial Assessment	Project	Model	Research & Report	Quiz	Presentation	Discussion	Laboratory Test	Home Exams	Monitoring
By the end of the program, student should be able to:												
A1)Demonstrate understanding of Concepts and theories of mathematics and sciences, appropriate to electrical engineering.	*	*	*			*	*	*	*	*	*	
A2) Demonstrate understanding of Basics of information and communication technology (ICT)	*	*	*				*		*	*	*	
A3) Demonstrate Characteristics of engineering materials related to electrical engineering.	*	*	*			*	*		*	*		
A4)Demonstrate Principles of design including elements design, process and/or a system related to electrical power engineering.	*	*	*	*			*		*	*	*	
A5) Illustrate Methodologies of solving engineering problems, data collection and interpretation	*	*	*	*	*	*	*		*	*		*
A6) Explain Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	*		*			*	*	*	*	*		
A7) Remember Business and management principles relevant to engineering.	*					*						*
A8) Explain Current engineering technologies as related to electrical engineering.	*	*	*	*	*	*	*	*	*	*		
A9) Discuss Topics related to humanitarian interests and moral issues.	*	*				*			*			*
A10) Write report with technical language	*	*	*			*	*	*	*	*		
A11) Recognise Professional ethics and impacts of engineering solutions on society and environment	*			*					*		*	*
A12) Recognise Contemporary engineering topics.	*		*	*		*						
A13) Choose analytical and computer methods appropriate for electrical power and machines engineering.	*		*				*		*			*
A14) Distinguish design methods and tools for electrical power and machines equipment and systems.	*		*				*		*	*		*
A15) Explain principles of operation and performance specifications of electrical and electromechanical engineering systems.	*		*			*	*	*	*			
A16) Apply fundamentals of engineering management.	*		*			*	*	*	*	*		
A17) Explain basic electrical power system theory.	*		*				*					*
A18) Apply theories and techniques for calculating short circuit, motor starting, and voltage drop.	*		*		*	*	*		*			
A19) Define diverse applications of electrical equipment.	*	*	*			*	*		*	*		
A20) Classify logic circuits.	*	*	*	*	*	*	*	*	*	*	*	
A21) Distinguish basic power system design concepts for underground, cable tray, grounding, and lighting systems.	*		*			*		*	*			
A22) Explain basics of low voltage power systems.	*						*					*
A23) Generalize principles of performing electrical system calculations, including load flow, earthing and equipment sizing.	*		*			*	*	*	*			
A24) Demonstrate Engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.	*	*	*	*	*	*	*	*	*	*	*	*
A25)Explain Quality assessment of computer systems;	*											
A26)Discuss Related research and current advances in the field of computer software and hardware.		*				*		*				*
A27) Recognise Technologies of data, image and graphics representation and organization on computer storage media.				*				*		*		
A28)Demonstrate Modern trends in information technology and its fundamental role in business enterprises.	*				*	*		*	*			

Intended Learning Outcomes (ILOS) of the program	Assessment Methods											
	Written Examine	Oral Examine	Tutorial Assessment	Project	Model	Research & Report	Quiz	Presentation	Discussion	Laboratory Test	Home Exams	Monitoring
By the end of the program, student should be able to:												
B1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.	*		*		*	*	*		*		*	*
B2) Select appropriate solutions for engineering problems based on analytical thinking.	*		*	*	*	*	*		*		*	*
B3) Think in a creative and innovative way in problem solving and design.	*	*	*	*	*	*	*	*	*	*		*
B4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.	*	*	*	*	*	*	*	*	*	*		
B5) Assess and evaluate the characteristics and performance of components, systems and processes.	*	*	*	*	*	*	*		*	*		
B6) Investigate the failure of components, systems, and processes.	*	*	*	*	*	*	*	*	*	*		
B7) Solve engineering problems, often on the basis of limited and possibly contradicting information.	*		*	*		*	*		*		*	
B8) Select and appraise appropriate ICT tools to a variety of engineering problems.	*		*			*		*		*		
B9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.	*		*	*		*	*	*	*		*	
B10) Incorporate economic, societal, environmental dimensions and risk management in design.	*		*	*		*		*	*		*	*
B11) Analyze results of numerical models and assess their limitations.	*	*	*			*	*		*	*	*	
B12) Create systematic and methodic approaches when dealing with new and advancing technology.	*		*	*		*	*		*			
B13) Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.	*		*			*	*		*			*
B14) Analyze design problems and interpret numerical data and test and examine components, equipment and systems of electrical power and machines.	*	*	*			*	*		*	*		
B15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	*	*	*	*	*	*	*	*	*	*		
B16) Analyze the performance of electric power generation, control and distribution systems	*		*	*	*	*		*	*			
B17)Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems.	*		*		*		*				*	
B18)Select, synthesize, and apply suitable IT tools to computer engineering problems.	*		*		*		*	*			*	*
B19)Proposing various computer-based solutions to business system problems. Cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved.	*		*		*		*	*			*	
B20)Identifying symptoms in problematic situations.	*		*	*	*		*	*			*	
B21)Innovating solutions based on non-traditional thinking and the use of latest technologies	*	*				*		*			*	*
B22)Capability of integrating computer objects running on different system configurations.	*		*		*		*			*		

Intended Learning Outcomes (ILOS) of the program	Assessment Methods											
	Written Examine	Oral Examine	Tutorial Assessment	Project	Model	Research & Report	Quiz	Presentation	Discussion	Laboratory Test	Home Exams	Monitoring
By the end of the program, student should be able to:												
C1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.	*	*	*	*		*	*	*	*	*	*	*
C2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.	*		*	*		*	*		*		*	
C3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.	*		*	*		*					*	
C4) Practice the neatness and aesthetics in design and approach.	*	*	*	*		*			*	*	*	
C5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.	*	*	*	*		*		*	*	*		
C6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.	*		*	*	*		*	*	*	*	*	
C7) Apply numerical modeling methods to engineering problems.	*		*	*	*	*		*	*	*		*
C8) Apply safe systems at work and observe the appropriate steps to manage risks.				*		*		*	*	*		
C9) Demonstrate basic organizational and project management skills.	*			*		*			*			*
C10) Apply quality assurance procedures and follow codes and standards.	*		*	*		*	*		*		*	*
C11) Exchange knowledge and skills with engineering community and industry.	*		*	*		*	*	*	*		*	
C12) Prepare and present technical reports.	*	*	*	*		*	*	*	*	*		
C13) Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems.	*	*	*	*	*	*	*		*	*		*
C14) Test and examine components, equipment and systems of electrical power and machines.		*				*			*	*		
C15) Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems.	*					*	*	*		*		*
C16) Specify and evaluate manufacturing of components and equipment related to electrical power and machines.						*						
C17) Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems.	*		*	*		*				*		
C18) Design and operate computer-based systems specifically designed for business applications.	*		*	*	*		*			*	*	*
C19)Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development;	*		*	*	*		*		*	*		*
C20)Write computer programs on professional levels achieving acceptable quality measures in software development.	*		*	*	*		*			*	*	
C21)Conducting user support activities competently.	*		*		*		*	*	*		*	

Intended Learning Outcomes (ILOS) of the program	Assessment Methods											
	Written Examine	Oral Examine	Tutorial Assessment	Project	Model	Research & Report	Quiz	Presentation	Discussion	Laboratory Test	Home Exams	Monitoring
By the end of the program, student should be able to:												
D1) Collaborate effectively within multidisciplinary team.	*	*	*		*	*	*	*		*		*
D2) Work in stressful environment and within constraints.	*		*				*	*	*	*		
D3) Communicate effectively.	*	*	*	*		*	*	*	*	*	*	*
D4) Demonstrate efficient IT capabilities.	*	*	*	*	*	*	*	*	*	*	*	*
D5) Lead and motivate individuals.	*	*	*	*	*	*	*	*	*	*	*	
D6) Effectively manage tasks, time, and resources.		*	*	*		*						
D7) Search for information and engage in life-long self learning discipline.	*		*	*		*	*	*	*		*	
D8) Acquire entrepreneurial skills.			*		*							*
D9) Refer to relevant literatures.	*	*	*	*	*	*	*	*	*	*	*	

13-Subject Area

a. List of University Requirements Core Courses (25 Credits)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social Sciences	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications	Projects and Practice	Discretionary (Institution
GEN 001	English Language	2	2		4	3	4						
GEN 002	Introduction to Computers	2		3	5	3	0.5	0.5	2		2		
GEN 101	Human Rights	2			2	2	2						
GEN 102	Project Management	2			2	2	2						
GEN 201	Presentation Skills	2	2		4	3	1				1	1	1
GEN 202	Foundation of Economics	2	2		4	3	4						
GEN 301	Writing Technical Report	2	2		4	3		2		1	1		

b. List of University Requirements Elected Courses (6 Credits)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social Sciences	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications	Projects and Practice	Discretionary (Institution
GEN 003	English Oral Communication and Pronunciation	2			2	2	2						
GEN 004	Advanced Spoken English	2			2	2							
GEN 103	Moral Philosophy	2			2	2	2						
GEN 203	Accounting	1	2		3	2							
GEN 204	Marketing	2			2	2	2						
GEN 302	Engineering Economy	1	2		3	2							

c. List of College Requirements Core Courses (45 Credits)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications	Projects and Practice	Discretionary (Institution
BES 001	Mathematics(1)	2	2		4	3		4					
BES 002	Physics (1)	2		3	5	3		2	2			1	
ECE 001	History of Engineering Science	2			2	2	1.333		0.667				
BES 003	Mathematics(2)	2	2		4	3		4					
BES 004	Chemistry	2		3	5	3		1	1	2		1	
BES 005	Physics (2)	2		3	5	3		2	2			1	
PRE 001	Applied Mechanics	2	2		4	3		2	1	1			
PRE 002	Fundamentals of Manufacturing Engineering	2			2	2	0.5		0.5	0.5			0.5
BES 101	Discrete Mathematics	1	2		3	2		3					
ECE 101	Energy Conversion	2	2		4	3	1	2	1				
BES 102	Probability and statistics	2	2		4	3		4					
ECE 201	Linear Programming	2	2		4	3		4					
ECE 401	Graduation Project	2	2		4	3	1			1	0.5	0.5	1

d- List of College Requirements Elected Courses (9 Credits)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications*	Projects and Practice	Discretionary (Institution
BES 103	Statistical Methods	2	2		4	3		3	1				
BES 104	Numerical Calculations	2	2		4	3		3	1				
ECE 102	IT Systems	2		3	5	3			0.5	0.5	2.5	1.5	
ECE 202	Electrical Material	2	2		4	3							
ECE 203	Linear Systems	2	2		4	3							
ECE 204	Integrated Circuits Engineering	2	2		4	3							

e-List of Specialization Requirements Major Core Courses (54 Credit)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications*	Projects and Practice	Discretionary (Institution
ECE 002	Electrical Drawing	1	4		5	3		2	1	2			
ECE 003	Electromagnetic Fields	2	2		4	3		2	2				
ECE 103	Electronics	2		3	5	3			2	1		1	1
ECE 104	Circuits (1)	2		3	5	3		1	2	1		1	
ECE 105	Digital Logic	2		3	5	3		2	1	1		1	
ECE 106	Measurements and Transducers	2		3	5	3		1	1	1		1	1
ECE 208	Microprocessors	2		3	5	3		1	1	2		1	
ECE 209	Electric Machines (1)	2		3	5	3			1	2		1	1
ECE 210	Database (1)	2		3	5	3		1	1	1	1	1	
ECE 211	Electrical Power Systems**(1)**	2		3	5	3			1	2		1	1
ECE 301	Automatic Control Systems	2		3	5	3		1	1	2		1	
ECE 302	Programmable Logic Controllers	2		3	5	3		1	1	1	1	1	
ECE 303	Power Electronics (1)	2		3	5	3			2	1		1	1
ECE 304	Computer Architecture	2		3	5	3			2	2		1	
ECE 402	Artificial Intelligence	2	2		4	3	1	1	1	0.5	0.5		

f-List of Specialization Requirements Major Elected Courses (9 Credit)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications*	Projects and Practice	Discretionary (Institution
ECE 305	Circuits (2)	2		3	5	3							
ECE 306	Data Base (2)	2		3	5	3							
ECE 307	Electric Machines (2)	2	2		4	3		1	1	1			1
ECE 403	Digital Control	2	2		4	3							
ECE 404	Digital Filters	2	2		4	3							
ECE 405	Electrical Power Systems (2)	2	2		4	3		1	1	1			1
ECE 406	Power Electronics (2)	2	2		4	3		1	1	1			1

G-List of Specialization Requirements Minor Core Courses (56 Credit)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications*	Projects and Practice	Discretionary (Institution
ECE 107	Data Structure	2	2		4	**3**			2	2			
ECE 108	Computer Programming(1)	2		3	5	**3**	1	1.5	1	1	0.5		1
ECE 109	System Analysis	2		3	5	**3**	1	1.5	1	1	0.5		1
ECE 212	Software Engineering	2		3	5	**3**		1	2	2			
ECE 213	Computer Programming (2)	2		3	5	**3**	1	1.5	1	1	0.5		1
ECE 214	Digital Electronics	2		3	5	**3**	1	1	1		1	1	1
ECE 308	Operating Systems	2		3	5	**3**		1	1	2	1		
ECE 309	Signal Processing	2		3	5	**3**		1.5	1	2	0.5		
ECE 407	Digital Signal Processing	2		3	5	**3**		1.5	1	2	0.5		
ECE 408	Computer Network	2		3	5	**3**	1		2	1.5	0.5		1
ECE 409	Computer Interfacing	2		3	5	**3**		1	2	1	1		
ECE 410	Electric Drives	2	2		4	**3**		1	2			1	
ECE 411	Power System Protection	2	2		4	**3**		1	2			1	
ECE 412	Industrial Training					**2**			1		0.5	0.5	

H-List of Specialization Requirements Minor Elected Courses (15 Credit)

Code	Course	Course Hours					A	B	C	D	E	F	G
		L	T	P	Σ	Cr	Humanities and Social	Mathematics and Basic	Basic Engineering	Applied Engineering	Computer Applications*	Projects and Practice	Discretionary (Institution
ECE 310	Multimedia Technology	2		3	5	3			1	2	1.5	0.5	
ECE 311	Neural Networks	2	2		4	3							
ECE 312	Graphics and Animation	2		3	5	3			1	2	1.5	0.5	
ECE 313	Special Machines	2	2		4	3			1	2			1
ECE 413	Computer Security	2		3	5	3							
ECE 414	Robotics	2		3	5	3		1	1	2	0.5	0.5	
ECE 415	High Voltage Engineering	2	2		4	3			1.5	1.5			1
ECE 416	Control of Electrical Machines	2	2		4	3							
Summation of Each Branch Hours							24.3	58.5	54.7	58	28.5	26	16
% Percentage= (Total of Each Branch Hours/Total Hours)							9.1	22.0	20.6	21.8	10.7	9.8	6.0
Tolerance (From NARS)							9-12	20-26	20-23	20-22	9-11	8-10	6-8

I. Activities and additional courses

Code	Course/activity	A	B	C	D	E	F	G
		Humanities and Social Sciences (Univ. Req.)	Mathematics and Basic Sciences	Basic Engineering Sciences (Faculty/Spec. Req.)	Applied Engineering and Design	Computer Applications and ICT	Projects* and Practice	Discretionary (Institution character-identifying) subjects
-------	Summer Training						10	
-------	Bachelor trip							3
------	Scientific Seminar			2				
	Other Activity (Students activities)							2
	Total	--	---	2	---	---	10	5

14- Program Structure

Period of Study	5 Years (180 Credit Hours)

Program structure

Hours	174	Theoretical	92	Practical	266	Total
	212	Mandatory	54	Elective	19	Not Bound

	Hours	%	Tolerance (NARS)
Humanities and Social Sciences	24.33	9.1	9-12
Mathematics and Basic Sciences	58.5	22	20-26
Basic Engineering Sciences	54.6	20.6	20-23
Applied Engineering and Design	58	21.8	20-22
Computer Applications and ICT	28.5	10.7	9-11
Projects and Practice	26	9.8	8-10
Discretionary subjects	16	6	6-8

15-ENROLLMENT REQUIREMENTS

- The student is enrolled for the bachelor degree in Electrical and Computer engineering according to acceptance rules set by the Universities Supreme Council.

16- RULES FOR COMPLETING THE PROGRAM

- The study follows the semester system with three semesters per year. First and second semesters extend for about 15 weeks and the third semester for about 6 Weeks.
- There are prerequisite courses that must be passed with at least 60% of final mark.
- Based on the request of the council of the concerned department and the approval of the faculty council, the student who does not meet the 75% attendance will be barred from taking the final examination. In this case, the student is considered to fail the courses he was barred from taking their final examinations.
- The fourth (final) Level students prepare a graduation project during the academicy year. The department councils determine its subjects. A four-week additional period after the final exams of the second semester is assigned to the graduation project.
- The council of each department should set a program for obligatory training after 120 Credit Hours during the summer vacation. The training period extends for 8 weeks inside or outside the faculty laboratories and workshops under the supervision of the teaching staff. Student can divide training period in two parts.
- The department councils arrange scientific tours for the third and fourth Level students. The tours are aimed at visiting industrial firms, engineering, cultural and service establishments so that the students become aware of the available technological systems. The tour is performed under the supervision of teaching staff from the concerned scientific departments. The arrangement of scientific tours for visiting industrial or engineering establishments extends to all students of the scientific departments.
- The student is entitled to be examined in courses he failed with the students currently studying the respective courses.
- Without desecration of the Faculty Regulation Law, the successful completion of a course is evaluated according to grade points as follows:

Percentage	Points	Equivalent Grade	Grade Symbol
=>95%	4.00	Excellent	A
90% To < 95%	3.60		A-
85% To <90%	3.30	Very Good	B+
80% To < 85%	3.00		B
75 % To < 80%	2.70	Good	B-
70% To <75%	2.30	Good	C+
65% To <70 %	2.00	Pass	C
60% To < 65%	1.7		C-
55 % To < 60%	1.3	Pass unless not a prerequisite to another subject	D+
50% To < 55%	1.0		D
< 50%	0.0	Fail	F

- **INDUSTRIAL TRAINING**

Requirements

- Students are required to undergo the Industrial Training program, irrespective of their working experience or previous training programs.
- Students must complete at least 8 weeks of Industrial Training in appropriate industries or firms.
- In order to participate in the Industrial Training program, students must have completed at least sixty (60) credit hours of subjects (from the Maths and Science, Major and Core categories only).
- Industrial Training is normally accumulated during the semester breaks after the end of 2nd level.
- Students are evaluated on their performance, and required to submit a formal written report about their experience before receiving a grade of Pass or Fail for the course.

Industrial Training Objectives

- To expose students to engineering experience and knowledge, required in industry, where these are not taught in the lecture rooms.
- To apply the engineering knowledge taught in the lecture rooms in real industrial situations.
- To use the experience gained from the 'Industrial Training' in discussions held in the lecture rooms.
- To get a realistic feel of the work environment.
- To gain experience in writing reports in engineering works/projects.
- To expose students to the engineers' responsibilities and ethics.
- To expose the students to future employers.
- With all the experience and knowledge acquired, the students will be able to choose appropriate work upon graduation.

Outcomes:

Upon successful completion of this course, a student will be able to:

- Write a formal report about her/his summer training experience and make an oral presentation.
- Apply safety rules in the work place.
- Be aware of professional and ethical responsibilities in the work place.
- Function and work with others as a team.

Topics:

- Vary according to students' industrial assignments.

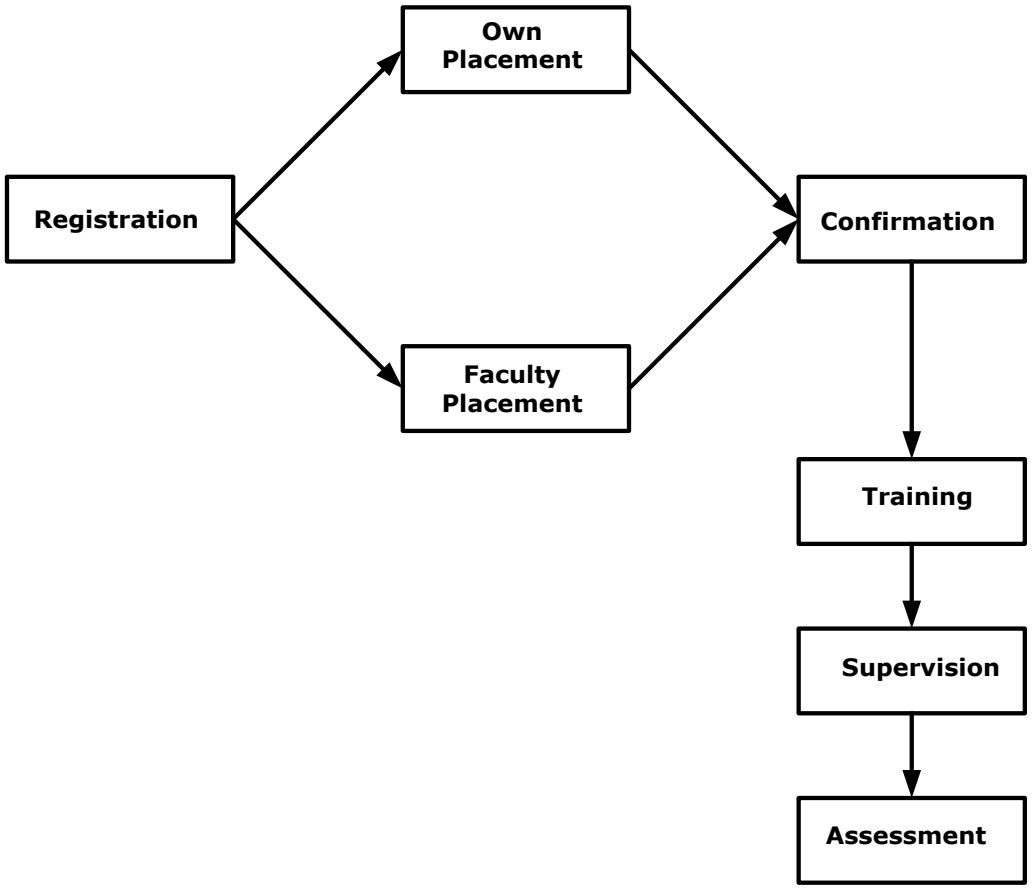
Computer Usage:

- Varies according to students' industrial assignments.

Evaluation Methods:

- Written report.
- Oral presentation.

Industrial Training Process



1. Registration:

Students who are going for the training must register at the Department. Confirmation of the registration would be done by completing and submitting the Industrial Training Agreement Form at the faculty office.
Verification and final approval of students in the Industrial Training process will be done based on the Agreement Form.

2. Placement:

a) Students are encouraged to apply for industrial training placement in companies via the faculty industrial training committee according to the procedures that have been predetermined by the Faculty. The committee will look closely into the companies' requirements and shortlist suitable students for the companies' selections, possibly based on their résumés and preferences. This gives the Faculty industrial training committee total right to decide the placements. The Faculty decision is final. If the student does not agree to the choice determined by the committee and the matter cannot be resolved between the student and the committee, then the student will have to postpone his or her industrial training.
b) If the student prefers to determine his own placement, then the choice of companies cannot be from the Faculty's list of companies. Furthermore, the industrial training committee will have to vet through the choice of company to determine that the company is able to provide

sufficient and suitable training to the student in the IT field. It is the student's responsibility to update the committee on the status of his application to the company concerned.

3. Confirmation:

Once the placements are confirmed, the Faculty will issue a confirmation letter to the company. A copy of the letter will be given to the student, which the student should bring when reporting for training.

4. Training:

Students must report for duty in accordance to the rules of the organization. They must adhere to, among others, the dress code, working hours and working practices of the company. Students are also expected to uphold the image of Minoufiya University at all times.

5. Supervision

- A faculty academic staff will be assigned to supervise a student. It is the responsibility of the supervisor and the student to discuss and correspond during the training. They must also work closely with the appointed supervisors at the respective organizations.
- Students are required to submit monthly progress reports to their supervisors and a final report at the end of the training period.
- The students' supervisors will visit them at least twice during the training period.
- Any complaint by the students and/or the supervisors will be taken seriously.

6. Assessment

The industrial training performance assessment will be based on:

- Industrial Training Supervisor's report where the student are attached for training (30%).
- Industrial Training Adviser report through visit or survey (20%).
- Industrial Training Report and oral Presentation (50%).

Based on the criteria above, the results of the Industrial Training is as follows:

a) Pass
b) Fail

Students are advised to give a serious consideration in writing their report. The report must be in good quality and explain all the industrial experience and knowledge gained. The report must not be in notes form and figurative form. If the report is not satisfactory, the students may be asked to rewrite the report again until it is in a satisfactory form.

Notes:

- Placement without prior approval does not count.
- Placement unregistered with the program does not count.
- An absolute minimum of 8 weeks of approved placement is necessary.

Plus passing the assessment is essential for graduation.

Industrial Training Visit by the Industrial Training Adviser

The objective of the Advisers visit to the training place is as follows:

- To visit the students involved with Industrial training and to discuss with them and the officers involved in giving the training on the matter of the training program or other matter concerned. Separate discussions will be held with the Lecturer and the training supervisor as well as with the students.
- To visit other former graduates of engineering faculty who may be working in the training organizations, which can give feedback on the courses offered by the program.
- To brief the officer of the training organizations on the engineering courses as well as making relations with the faculty.
- To survey any new training places for industrial training.
- To discuss on the possibility on accepting the graduate to work with company. The students and the company will be informed by the date and time of the visit.

Students are not allowed to change the place of training during the industrial training period except aftervgetting written permissions by the Industrial Training Adviser of the respective discipline. If there are valid reasons of the change of placement, the students need to discuss this with the Industrial Training Adviser.

17-METHODS OF EVALUATING THE PROGRAM

Evaluator	Tools	Examples
Final year students	Questionnaire	•
Graduates	Questionnaire	•
Stakeholders	Questionnaire	•
External Evaluators	Evaluation reports	
Others	Students scientific conference. Seminars.	Last students scientific conference was in semester 2011-2012

Coordinator of Program Quality assurance committee	Head of Electrical Dept. Council
Prof.Ashraf Salah El Din Zein El Din **Date: 2 May 2012**	**Prof.Dr. Shaban Mabrouk Osheba** **Date: 2 May 2012**

Electrical and Computer Engineering Program Contents

a. List of University Requirements Core Courses (25 Credits)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
GEN 001	English Language	2	2		4	3	A9,A10,B4,C12,D3,D9	**100**
GEN 002	Introduction to Computers	2		3	5	3	A2,A25,B1,B8,C1,C6,C7,D3,D4	**100**
GEN 101	Human Rights	2			2	2	A9,B10,C8,D1,D3	**100**
GEN 102	Project Management	2			2	2	A6,A7,A16,B9,B10,C9,C10,D1,D2,D5,D8	**100**
GEN 201	Presentation Skills	2	2		4	3	A9,A11,A28,B21,C19,D4,D5,D6,D7	**100**
GEN 202	Foundation of Economics	2	2		4	3	A9,B3,B10,C1,D3	**100**
GEN 301	Writing Technical Report	2	2		4	3	A6,A10,B9,B11,B13,C12,C16,D1,D8	**100**

b. List of University Requirements Elected Courses (6 Credits)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
GEN 003	English Oral Communication and Pronunciation	2			2	2	A9,B4,C4,C12,D3,D9	**100**
GEN 004	Advanced Spoken English	2			2	2	A9,B4,C4,C12,D3,D9	**100**
GEN 103	Moral Philosophy	2			2	2	A11,B2,C4,D1,D3	**100**
GEN 203	Accounting	1	2		3	2	A7,B1,C1,D1,D8	**100**
GEN 204	Marketing	2			2	2	A7,B1,B10,C9,C11,D1,D8	**100**
GEN 302	Engineering Economy	1	2		3	2	A5,A16,B3,B9,B10,C1,C10,D3	**100**

c. List of College Requirements Core Courses (45 Credits)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
BES 001	Mathematics (1)	2	2		4	3	A1,A5,B1,C1,C7,D3	**100**
BES 002	Physics (1)	2		3	5	3	A1,A3,B2,B3,C1,D3	**100**
ECE 001	History of Engineering Science	2			2	2	A8,B3,B12,C2,D1,D3,D6	**100**
BES 003	Mathematics (2)	2	2		4	3	A1,A5,B1,C1,C7,D3	**100**
BES 004	Chemistry	2		3	5	3	A1,B5,C1,C5,D2,D5	**100**
BES 005	Physics (2)	2		3	5	3	A1,A3,B2,B3,C1,D3	**100**
PRE 001	Applied Mechanics	2	2		4	3	A1,B2,C1,D3	**100**
PRE 002	Fundamentals of Manufacturing Engineering	2			2	2	A3,A6,A8,B3,C1,C8,C11,D2	**100**
BES 101	Discrete Mathematics	1	2		3	2	A1,A5,B1,C1,C7,D3	**100**
ECE 101	Energy Conversion	2	2		4	3	A1,A3,A15,A17,B4,B13,C13,D7	**100**
BES 102	Probability and statistics	2	2		4	3	A1,B1,B11,C1,C7,D1	**100**
ECE 201	Linear Programming	2	2		4	3	A1,A5,B7,B9,C1,D1,D4	**100**
ECE 401	Graduation Project	2	2		4	3	A5,A10,A14,A16,A18,B1,C1,C5, C7, C9, C10,C11,C12,C13, C14,C15,C16,C17,C18	**100**

d- List of College Requirements Elected Courses (9 Credits)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
BES 103	Statistical Methods	2	2		4	3	A1,A5,B1,B11,C1,C7,D3	100
BES 104	Numerical Calculations	2	2		4	3	A1,A5,B1,C1,C7,D1,D3	100
ECE 102	IT Systems	2		3	5	3	A2,A25,A27,A28,B18,B22,C18, C19,D3,D4	100
ECE 202	Electrical Material	2	2		4	3	A3,A21,B5,B6,C7,C16,D6	100
ECE 203	Linear Systems	2	2		4	3	A4,B14,C6,C12,D1,D3,D4	100
ECE 204	Integrated Circuits Engineering	2	2		4	3	A24,B5,C5,D1,D4	100

e-List of Specialization Requirements Major Core Courses (54 Credit)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
ECE 002	Electrical Drawing	**1**	**4**		**5**	**3**	A14,B3,C13,D1	100
ECE 003	Electromagnetic Fields	**2**	**2**		**4**	**3**	A1,A3,A8,A15,B2,B13,C1,D1	100
ECE 103	Electronics	**2**		**3**	**5**	**3**	A8,B13,B15,C13,D1,D4	100
ECE 104	Circuits (1)	**2**		**3**	**5**	**3**	A13,A17,A22,B13,C13,D1,D4	100
ECE 105	Digital Logic	**2**		**3**	**5**	**3**	A20,B15,C13,D1,D4	100
ECE 106	Measurements and Transducers	**2**		**3**	**5**	**3**	A3,A19,B1,B6,C1,C3,C4,C5,D4,D9	100
ECE 208	Microprocessors	**2**		**3**	**5**	**3**	A14,A20,A24,A25,B18,C15,C19,D4	100
ECE 209	Electric Machines (1)	**2**		**3**	**5**	**3**	A4,A15,A18,A19,B5,B13,C13,C14,D1	100
ECE 210	Database (1)	**2**		**3**	**5**	**3**	A7,A27,A28,B1,B17,B18,B19,B21, C2,C19,C21,D1,D3,D4,D8	100
ECE 211	Electrical Power Systems **(1)**	**2**		**3**	**5**	**3**	A15,A17,A18,A22,B13,B16,C16,D9	100
ECE 301	Automatic Control Systems	**2**		**3**	**5**	**3**	A1,A5,B1,B8,B13,B14,B16,C6,C17, D1,D3,D4	100
ECE 302	Programmable Logic Controllers	**2**		**3**	**5**	**3**	A5,A14,A20,B3,B15,C3,C6,C13,D3, D7	100
ECE 303	Power Electronics (1)	**2**		**3**	**5**	**3**	A4,A8,A19,B13,C13,D6	100
ECE 304	Computer Architecture	**2**		**3**	**5**	**3**	A2,A20,A24,A25,B18ECE302,,C19,D 4	100
ECE 402	Artificial Intelligence	**2**	**2**		**4**	**3**	A24,B18,C19,C20,D4	100

f-List of Specialization Requirements Major Elected Courses (9 Credit)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
ECE 305	Circuits (2)	**2**		**3**	**5**	**3**	A13,A17,A22,B13,C7,D1,D4	100
ECE 306	Data Base (2)	**2**		**3**	**5**	**3**	A7,A27,A28,B1,B1,B12,B17,B18, B19,B21,C2,C18,C19,C21,D1, D3, D4,D8	100
ECE 307	Electric Machines (2)	**2**	**2**		**4**	**3**	A4,A15,A18,A19,B5,B13,C14,D1	100
ECE 403	Digital Control	**2**	**2**		**4**	**3**	A13,A14,B1,C13,C20,D1,D4	100
ECE 404	Digital Filters	**2**	**2**		**4**	**3**	A8,A14,A24,B1,C13,C20,D1,D4	100
ECE 405	Electrical Power Systems (2)	**2**	**2**		**4**	**3**	A15,A17,A18,A23,B13,B14,C1,C17, D9	100
ECE 406	Power Electronics (2)	**2**	**2**		**4**	**3**	A8,A19,B13,C13,C17,D6	100

G-List of Specialization Requirements Minor Core Courses (56 Credit)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
ECE 107	Data Structure	2	2		4	3	A5,A13,A27,B1,B2,B7,B8,B12,B17, B19,C2,C6,C20,D1,D4	100
ECE 108	Computer Programming (1)	2		3	5	3	A2,A5,A13,B1,B2,B7,B8,C1,C5,C6, D4,D7	100
ECE 109	System Analysis	2		3	5	3	A5,A7,A11,A27,A28,B8,B18,B19,B20, B21,C2,C3,C9,C18,C21,D1,D3,D4,D5, D8	100
ECE 212	Software Engineering	2		3	5	3	A26,B17,B21,C3,C8,C9,C19,C20,D4	100
ECE 213	Computer Programming (2)	2		3	5	3	A2,A5,A9,A13,B1,B2,B7,B8,C1,C5, C6, D3,D4	100
ECE 214	Digital Electronics	2		3	5	3	A1,A20,B15,C13,C15,C18,D1,D4	100
ECE 308	Operating Systems	2		3	5	3	A27,B18,C19,D1,D4	100
ECE 309	Signal Processing	2		3	5	3	A27,B18,B21,C19,D1,D4	100
ECE 407	Digital Signal Processing	2		3	5	3	A4,A12,B13,B14,C17,D1,D3,D4	100
ECE 408	Computer Network	2		3	5	3	A12,A26,A27,B18,B22,C18,C19,D4	100
ECE 409	Computer Interfacing	2		3	5	3	A12,A20,A24,A26,B18,B21,B22,C1, C4,C15,C20,D1,D4	100
ECE 410	Electric Drives	2	2		4	3	A4,A13,A14,A19,B13,B16,C16,C17, D1,D3	100
ECE 411	Power System Protection	2	2		4	3	A4,A6,A8,A19,A21,A23,B2,C13,D2, D9	100
ECE 412	Industrial Training					2	A6,A10,A12,A16,A23,A25,B6,B20, B22,C2,C5,C10,C11,C12,C13,C14, C15,C16,C17,D1,D3,D4,D8	100

H-List of Specialization Requirements Minor Elected Courses (15 Credit)

Code	Course	Course Hours					Program ILOs Covered (By No.)	Assessment Marks
		L	T	P	Σ	Cr		
ECE 310	Multimedia Technology	2		3	5	3	A27,B18,C19,D1,D4	100
ECE 311	Neural Networks	2	2		4	3	A12,A24,B12,B18,C15,C19,C20,D1, D3,D4	100
ECE 312	Graphics and Animation	2		3	5	3	A27,B18,C3,C19,D1,D4	100
ECE 313	Special Machines	2	2		4	3	A12,A15,B13,B14,C2,C3,C7,C16,D2	100
ECE 413	Computer Security	2		3	5	3	A24,A26,B18,B21,C18,C19,D1,D4	100
ECE 414	Robotics	2		3	5	3	A15,B5,B15,C1,C15,D3,D7	100
ECE 415	High Voltage Engineering	2	2		4	3	A1,A6,A8,A21,B5,B13,C1,C5,D2,D6	100
ECE 416	Control of Electrical Machines	2	2		4	3	A4,A13,A14,A19,B13,B16,C16,C17, D1,D3	100